QuABO

An Interview with Cmdr. John Ingersoll

Cmdr. Ingersoll is a Reservist who has supported the Space and Naval Warfare Systems Center (SSC) Charleston in a number of capacities for the last five years. As a physicist specializing in quantum physics, he has developed a concept of knowledge discovery based on quantum physics principles, which he theorizes can assist, among other Defense Department and Department of the Navy developing approaches, in thwarting a terrorist threat before it occurs.

His concept, called Quantum Affects-Based Operations (QuABO), can provide new insight and novel problem-solving approaches to the war on terror. Using the tenets of quantum physics at the macroscopic level and potentially relying on meta-systems theories, medical research and other scientific discoveries, QuABO, at the core of the Knowledge Discovery Program (KDP), can lead to adaptive results aimed at dealing effectively with asymmetrical warfare.

CHIPS asked Cmdr. Ingersoll to discuss the QuABO concept in August 2006.

CHIPS: What gave you the idea for the Knowledge Discovery Project and using quantum physics in the development of the QuABO?

Cmdr. Ingersoll: During my Reserve duty about four years ago, I was in a discussion about traditional command, control, communications, computers, intelligence, surveillance and reconnaissance (C4ISR) activities with some SSC Charleston personnel. The discussions centered on ideas as to what could be done to counter the enemy's asymmetric advantage.

In this situation, our adversaries employ strategies and tactics outside the bounds of conventional warfare in an attempt to level the huge disparity due to our military and technological superiority.

In response, we developed a concept called Quantum Affects-Based Operations. The idea is to use the tenets of quantum physics to a process that can be applied to the war against terror.

CHIPS: I've read about the exploration of innovative alternative approaches to solving this problem.

Cmdr. Ingersoll: In the last several years, the DoD realized that traditional warfare is not as effective in dealing with asymmetrical warfare, such as the war on terror. U.S. military forces have implemented other techniques in addition to traditional warfare as an approach to this problem.

This approach is essentially a realization of the effects-based operations (EBO) concept. The EBO idea has its origins in the Vietnam War era, when we realized that military actions alone were not sufficient to win the war. You can win battles militarily and still end up losing the war. That evolution of EBO attempts to augment military operations with a much broader scope of elements well beyond the traditional sense of attrition or warfare.

These elements may include a combination of diplomatic, information, military and economic (DIME) instruments or actions. By uniting all of these other elements, you could win ultimately. However, EBO type approaches can be best applied to determine the outcome of 'what if scenarios' to impart valuable knowledge to analysts about possible outcomes as well as the likelihood of unintended consequences of specific actions.

We are offering the QuABO model as an alternative approach based on the concepts of quantum physics applied to the macroscopic world. We are using the concepts of interconnectedness, uncertainty or indeterminacy and coherence to develop a new approach to dealing with the enemy.

CHIPS: How is the QuABO different than the effects-based model in addressing this problem?

Cmdr. Ingersoll: The solution perceived in recent years is to analyze a lot of data with the hope that one can extract something meaningful. But there is too much information, and you are essentially drowning in it. Computational power is not sufficient to deal with the situation and even the best artificial intelligence we have cannot deal with the problem.

Some data can be irrelevant. The enemy may be deliberately sending us information that is useless in the hope that we will spend a lot of time trying to figure out something out of nothing.

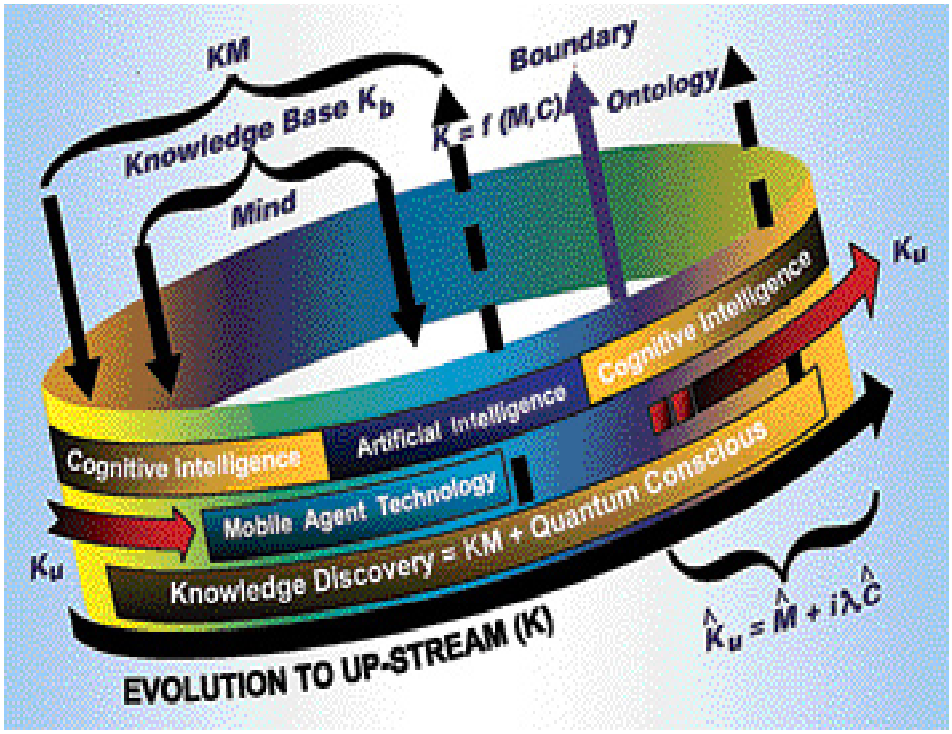

Figure 1. The Knowledge Discovery Continuum.

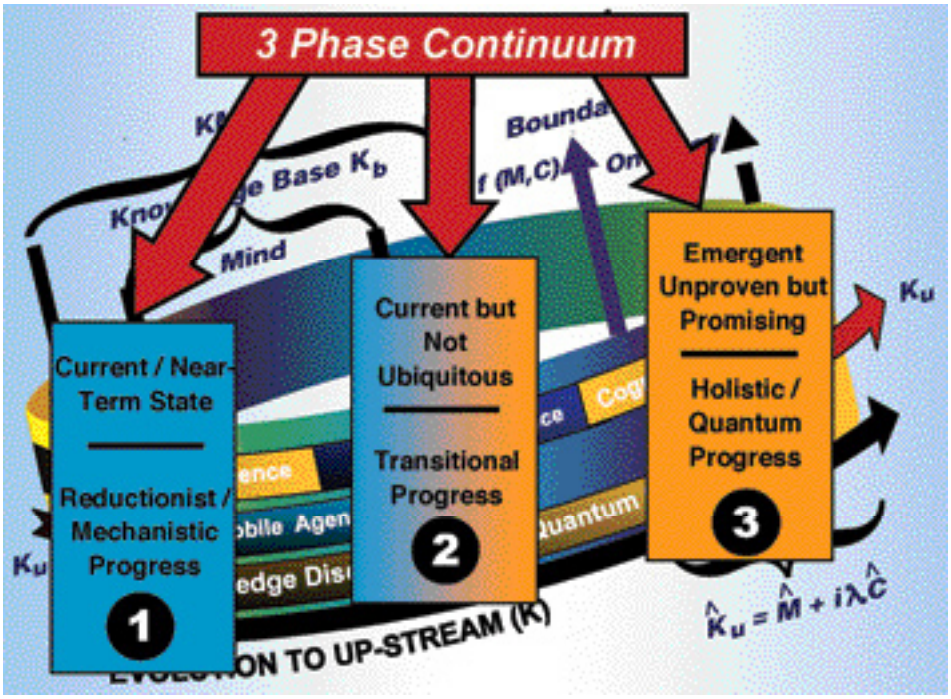

Figure 2 shows the evolution of Knowledge Discovery. No. 1 is where we are right now — the state of knowledge management or knowledge discovery as it is today. No. 2 shows the opportunities that we currently have but are not using. Semantic Web technology is an example of that. No. 3 shows the emergent QuABO concept of using new methods for creating knowledge that have not been used in the past.

We have tried to rely on machinery too much for direction. Human beings are the fundamental component of making intelligent decisions. Consequently, QuABO attempts to rectify this imbalance by refocusing human intelligence and knowledge discovery principles.

The tenets of knowledge discovery can be summarized in four bullets shown here:

- How to make use of the abundance of information available to the maximum advantage of the warfighter;
- How to discover the 'unknown unknown';
- How to remove information "overload" as a problem;
- How to reach ground truth on any given issue.

For DoD, enabling the warfighter is the ultimate objective. The 'ground truth' is ultimately our goal. Ground truth is not preordained; it is based on our constitution as sentient beings within the moral compass of our consciousness.

The reality is created as we move forward. All the elements of bias must be stripped to figure out what is there.

The schematic, Figure 1, is an evolving continuum. First of all, you have to distinguish between information and knowledge. Information means all kinds of data. Knowledge discovery means something that has an intelligent or utilitarian aspect to it. It is usually actionable. Figure 2 shows the progression of the knowledge discovery evolution.

Knowledge discovery is much more profound than information. Knowledge discovery can be created only with human interaction; it cannot be created by machines. That is an important distinction.

Knowledge discovery is continuously augmented or discovered, like a spiral where you keep adding value, and moving to higher and higher levels. Figure 3 illustrates this concept in how knowledge will find users in the future.

CHIPS: How does quantum physics play a part in this process?

Cmdr. Ingersoll: One of our claims, based in quantum physics, is that the human intelligence/interaction is not constrained within our physical bodies.

Knowledge discovery in our model consists of two independent entities: One is matter and/or energy. The second is consciousness, which is not directly measurable or quantifiable by physical means, but it can be inferred indirectly.

Knowledge discovery is the outcome of the interaction of these two independent entities among intelligent beings and their environment.

The world is becoming more and more intertwined. It represents now a much bigger entity. The increasing complexity of this entity makes it very difficult to figure out how to continue improving our productivity and our standard of living, for example.

You may note that I have used the word entity rather than system in order to differentiate between the quantum and classical concepts, respectively.

The current approach to dealing with complex systems has worked very well for the last 300 years, but in the last 40 years that model has started failing.

The view of the world as an assembly of vastly independent entities is no longer a valid approach. You have to work in a holistic way where everything is considered in its totality.

We cannot use a mechanistic view to do that. We have to enable a totally different approach. The quantum process is what we think could provide a solution to the present situation.

Our approach is to give the individuals at the bottom the ability to function, interact and make decisions. Instead of the current top-down method of command and control, we can create a bottom-up approach that engages everybody who cares to participate over a period of time determined by the participants.

Our adversaries in the war on terror lack our sophisticated organization and structure. There is no single authority; no single individual on the ground who makes decisions for all. Hence, they appear to be decentralized, informal and highly adaptive. The conflict then becomes asymmetric.

Knowledge discovery realized through QuABO becomes, in our opinion, the key element in combating asymmetric warfare effectively.

CHIPS: In this holistic approach, who would be contributing to knowledge discovery?

Cmdr. Ingersoll: A large number of voluntarily participating individuals from diverse backgrounds and multiple disciplines, for example, warfighters, civilians

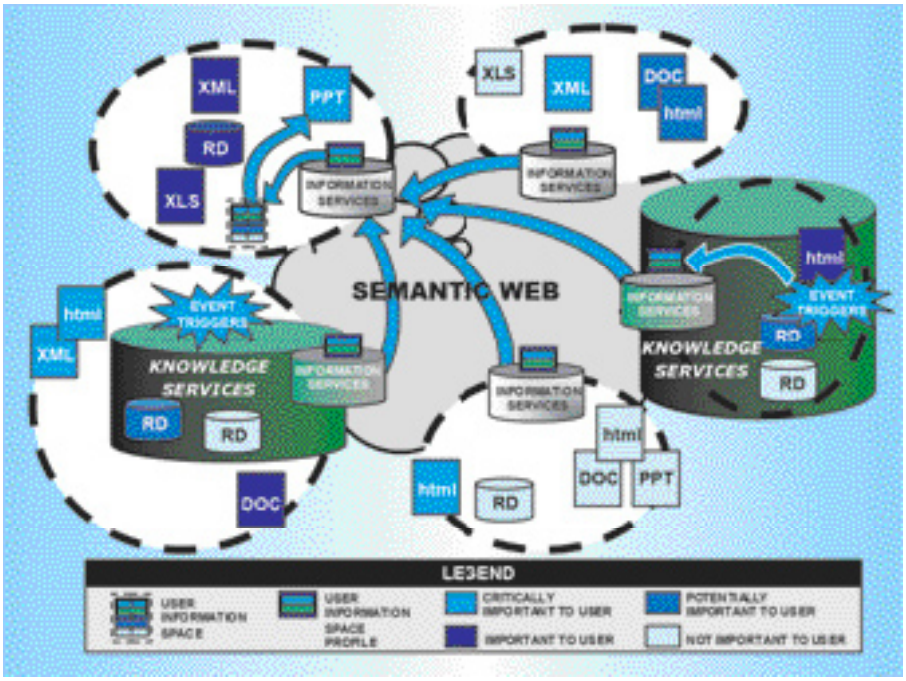

Figure 3 illustrates the concept of how knowledge will find users in the knowledge continuum.

"Knowledge discovery is much more profound than information. Knowledge discovery can be created only with human interaction; it cannot be created by machines. That is an important distinction. Knowledge discovery is continuously augmented or discovered, like a spiral where you keep adding value, and moving to higher and higher levels."

– Cmdr. John Ingersoll

and others associated with a particular situation or event. These participants would adhere to a prescribed interaction process instead of attempting to produce a preconceived outcome.

This interaction would take place at a 'present' time, which is expanded to fit the needs of the situation at hand. Communication among these participants will be in real time, in person or over large distances facilitated with the aid of modern technology.

CHIPS: How is QuABO and, by extension, knowledge discovery different?

Cmdr. Ingersoll: In classical mechanics I can watch everything around me and separate myself from the rest of the universe as an 'objective' observer.

In quantum physics that is impossible: objective is supplanted by subjective. I am part of the equation, and every time I chose to interact with my environment, I change it, while it changes me. Hence, the origin of 'affect' versus 'effect.'

The key part is that I cannot be an observer without affecting the entity I am interacting with. Knowledge discovery is not my contribution, your contribution or another person's contribution. It becomes a combined outcome of the interaction of all participants.

The underlying process is akin to 'the invisible hand' that Adam Smith used to describe the actions of the large number of actors in a free market economy. The appropriate interaction of a large number of human actors augmented by technology would realize QuABO in any particular situation.

There are a lot of mysteries about how sensors work in the body. If we can figure out how they work, we can potentially apply it to the real world and use that to enhance physical communications. There is a lot of intuitive processing that happens within the body.

CHIPS: So you will be looking beyond visible and audio communications?

Cmdr. Ingersoll: Yes. For example, the total of your communication with people that you know well — parents, significant other, children — cannot be entirely described by physical means or biology, physics or chemistry alone. There is another level of interaction that creates this communication, which we call consciousness.

There are still many unknowns about the human body and human interaction. Our concept needs to be developed further. We have established a team of eight made up of people from multiple disciplines. On our team now we have, for example, a theology major who understands cultural differences. The team has a dynamic of both educational and cultural diversities.

It is important for the team to get along and to share and create something that is bigger than what each team member could produce on his or her own.

We need a three-year period for additional research to understand how to derive benefits for the warfighter from the QuABO model by developing the proper analytical and other simulation tools of the process in order to be able to design and carry out suitable interactions pertaining to actual situations.

We want to deliver as much as we can to the warfighter — as soon as we can. CHIPS

Cmdr. John Ingersoll is a Reservist and part of SPAWAR Reserve Unit 506 stationed in Norfolk, Va. SPAWAR Reservists possess unique, highly technical skill sets. SPAWAR Reserve Unit 506 has employed Ingersoll's unique physics and engineering duty officer abilities to solve tough fleet issues for several years.